

# CLAIMS

1. Device for handling and recovering kinetic energy in a fluid, characterised in that it comprises:

- a bladed reversible impeller (11)
- a reversible engine/generator (12) integral with the bladed impeller;
- a fluid conveyor (7) which cooperates with the impeller to handle and recover the kinetic energy the incoming fluid;

2. Device as in claim 1 characterised in that said bladed impeller (11) is supplied by the fluid through said fluid conveyor (7), in such a way it can slow down and convey mechanical power to the engine/generator (12), now operating as an electric generator, and in that the bladed impeller (11) can be accelerated by the engine/generator (12), operating as an engine, and operate as a centrifugal blower delivering fluid under pressure by means of the fluid conveyor (7).

3. Device as in claim 1, characterised in that said fluid conveyor (7)

comprises:

- a convergent spiral of the fluid inlet (15) that receives the incoming fluid;
- a divergent spiral of the fluid outlet (16) that generates an outgoing fluid under pressure.

4. Device as in claim 3, characterised in that said fluid conveyor (7) includes also a duct (17) for recirculation or partial exhaust of excess fluid.

5. Device as in claim.1, characterised in that said engine/generator (12) is integral with the bladed flow impeller (11) by means of a shaft.

6. Device as in claim 1 characterised in that said engine/generator (12) is a high efficiency permanent magnet brushless electric three-phase synchronous machine which is supplied, as an engine, with alternate three-phase variable high frequency current and outputs as a generator an alternate three-phase current.

7. Device as in any of the previous claims, characterised in that it is a single assembly body also comprising:

- an engine/generator (11) casing (8) equipped with cooler;
- a rear cover (9) integral with the said casing (8);
- a front cover (10) with relevant cooler, integral with the said fluid conveyor (7),

such single body containing inside the said engine/generator (12), the bladed impeller (11) and shaft (13).

8. Device as in claim 7, characterised in that said rotation shaft (13) is inserted in the said front and rear covers (9,10) by means of antifriction bearings (14).

9. Device as in any of the previous claims, characterised in that it is made of aluminum alloy or stainless steel or titanium or ceramic material or composite materials such as fiber reinforced techno polymer.

10. Overcharged engine including a turbo supercharger, characterised in that it comprises a device as in any of the previous claims, assembled in series between the said turbo supercharger and the engine pressurized fluid inlet.

11. Engine as in claim 10, characterised in that it is a road trailer internal combustion engine.

12. Engine as in claim 10, characterised in that it is an aviation piston propulsor.

13. Engine as in claim 10, characterised in that it is an internal combustion engine for marine propulsion.

14. Engine as in claim 10, characterised in that it is a two-stroke-cycle internal combustion engine.